REMARKS

The applicants have amended the claims to put them into condition for allowance. In view of the amendments and the following reasoning for allowance, the applicants hereby respectfully request further examination and reconsideration of the subject application.

A.   Interview Summary

On 19 June 2007 an Examiner Interview was conducted between Examiner Erick Rekstad and Katrina Lyon. The after final amendment was discussed. Specifically, the amendment the claims to specifiy a non-zero distance between virtual centers was discussed. The importance of the predefined distance was discussed in that the distance between virtual centers was selected so as to minimize parallax error for the user at a predefined distance, while still allowing the camera to be of a small enough size for video conferencing.

B.   The 35 USC 132(a) Objection to the Specification and the Objection to the Drawings

The applicant withdraws the drawing changes submitted on March 6, 2007, and cancels the amendment to the specification submitted on this date which was alleged to be new matter to restore both the specification and drawings to their original state. The applicants note that the original equations for the exemplary embodiment are approximations for the equations that were submitted on March 6, 2007. No admission is made that this previous amendment is new matter.

C.   The 35 USC 102(e) Rejection of Claims 1-3, 5-9, 13, 14, 17, 19, 20, 22 and 23.

Claims 1-3, 5-9, 13, 14, 17, 19, 20, 22 and 23 were rejected under 35 USC 102(e) as being anticipated by Nalwa, U.S. Patent No. 6,128,143, herein after referred to as Nalwa. It was contended in the above-identified Office Action that Nalwa teaches

all the elements of the rejected claims. The applicants respectfully disagree with this contention of anticipation.

The applicants' claimed invention is a camera system that uses N cameras and an N sided mirror to capture images of the surrounding scene. The images from the N cameras are stitched together to create a 360-degree panorama using a calibration surface. The camera system uses the N-sided mirror **to create a camera array with a very small distance D between the virtual centers of projections of the cameras in the array. This distance D is a non-zero value. The distance is selected so as to provide minimal parallax error at a predefined distance from the cameras.** It is not necessary to have an identical center of projection, or virtual center of projection, if the distance between the camera and objects of interest is restricted. This is the case in most video-conferencing applications where the size of the conference room table, and typically the conference room, is limited. By using domain knowledge of the typical conference room table size and so relaxing the constraint of the distance D between adjacent camera's virtual centers of projection, the total camera system size can be made significantly smaller. A smaller camera is desirable as it becomes less obtrusive and is less expensive to build. The applicants' claimed invention employs this principle to create a small camera system that can be used for video conferencing. (Summary, emphasis added)

In contrast, Nalwa teaches a camera system comprising an N-sided reflective surface (40) and N cameras (52, 54, 55 and 58). **Nalwa teaches that the cameras are aligned so that the have the same virtual center**, as cited by the Examiner on page 2 of the Office Action, last paragraph.

Nalwa does not teach the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras.** If each camera had an identical virtual center of projection, as is the case in Nalwa, it would be necessary to use large mirrors. Large mirrors are undesirable for video-

conferencing purposes as the camera array should be very small and unobtrusive when it sits in the center of a conference room table.

A prima facie case of anticipation is established only when the Examiner shows, inter alia, that the cited reference teaches each of the claimed elements of a rejected claim. In this case, the Nalwa reference does not teach the advantageous features of the applicants' claimed invention such as the applicant's claimed "N cameras each associated with a different side of said N-sided reflective surface, and **aligned to have a small non-zero distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras**" which allows for the creation of a small and unobtrusive camera for video conferencing using small mirrors. Thus, the rejected claims recite advantageous features that are not taught in the cited art, and as such a prima facie case of anticipation is not established. It is, therefore, respectfully requested that the rejection of Claims 1-3, 5-9, 13, 14, 17, 19, 20, 22 and 23 be reconsidered based on the exemplary novel claim language:

> "A camera system comprising:
> an N-sided reflective surface that reflects its surroundings in 360 degrees;
> N cameras each associated with a different side of said N-sided reflective surface, and **aligned to have a small non-zero distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras**, each of N cameras aligned to capture a reflected image in its associated reflective surface; and
> an image stitcher for stitching each of said reflected images taken by adjacent cameras together to create a panoramic image. "
> (emphasis added)

And,

> "A process of capturing video for teleconferencing and meeting recording, comprising the following process actions:
> capturing images of an event in 360 degree with an omni-directional camera array, wherein said omni-directional camera comprises an N-sided mirror located above **N cameras arranged to be equally spaced around the circumference of a circle in a circular fashion and tilted upward slightly from the horizontal plane, and positioned to have a small non-zero distance between their virtual centers of projection so as to provide minimal parallax error at a predefined distance from the cameras**, each

capturing an image reflected in a different side of said N-sided mirror; and

stitching together said images captured by each of N cameras using a calibration surface to create a composite image." (emphasis added)

And,

"A computer-readable medium having computer-executable instructions for viewing or recording a video-conference, said computer executable instructions comprising:

capturing images of persons in an event with an camera, wherein said camera comprises an N-sided mirror located above N cameras arranged to be equally spaced around at least a portion of a circle, **such that said N cameras have a non-zero virtual center of projection so as to provide minimal parallax error at a predefined distance from the cameras,** and tilted upward slightly from the horizontal plane, each capturing an image reflected in a different side of said N-sided mirror; and

stitching together said images captured by each of N cameras using a calibration surface to create a composite image." (emphasis added)

D.   The 35 USC 103 Rejection of Claim 24.

Claim 24 was rejected under 35 USC 103(a) as being unpatentable over Nalwa. No other reference was cited. The Examiner contended that though Nalwa does not teach building a viewer which does not provide a full 360 degree view, this feature would have been obvious to one of ordinary skill in the art (official notice was taken). The applicants respectfully disagree with this contention of obviousness.

In order to deem the applicants' claimed invention unpatentable under 35 USC 103, a prima facie showing of obviousness must be made. To make a prima facie showing of obviousness, all of the claimed elements of an applicants' invention must be considered, especially when they are missing from the prior art. If a claimed element is not taught in the prior art and has advantages not appreciated by the prior art, then no prima facie case of obviousness exists. The Federal Circuit court has stated that it was error not to distinguish claims over a combination of prior art references where a material limitation in the claimed system and its purpose was not taught therein (*In Re Fine*, 837 F.2d 107, 5 USPQ2d 1596 (Fed. Cir. 1988)).

As discussed above, the applicants' claimed invention is a camera system that uses N cameras and an N sided mirror to capture images of the surrounding scene. The images from the N cameras are stitched together to create a 360-degree panorama using a calibration surface. The camera system uses the N-sided mirror **to create a camera array with a very small distance D between the virtual centers of projections of the cameras in the array so as to provide minimal parallax error at a predefined distance from the cameras. This distance D is a non-zero value, however.** (Summary, emphasis added)

In contrast, Nalwa teaches a camera system comprising an N-sided reflective surface (40) and N cameras (52, 54, 55 and 58). **Nalwa teaches that the cameras are aligned so that the have the same virtual center,** as cited by the Examiner on page 2 of the Office Action, last paragraph.

Nalwa does not teach the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras.** If each camera had an identical virtual center of projection, as is the case in Nalwa, it would be necessary to use large mirrors. Large mirrors are undesirable for video-conferencing purposes as the camera array should be very small and unobtrusive when it sits in the center of a conference room table.

Additionally, the Nalwa reference does not teach the advantageous features of the applicants' claimed invention such as being to build a small camera with small reflective surfaces so that it is unobtrusive and suitable for video conferencing purposes. Accordingly, no prima facie case of obviousness has been established in accordance with the holding of *In Re Fine*. This lack of prima facie showing of obviousness means that the rejected claims are patentable under 35 USC 103 over Nalwa. As such, it is respectfully requested that Claim 24 be allowed based on the following claim language:

" ...capturing images of persons in an event with an camera,
wherein said camera comprises an N-sided mirror located above N

cameras arranged to be equally spaced around at least a portion of a circle, **such that said N cameras have a non-zero virtual center of projection <u>so as to provide minimal parallax error at a predefined distance from the cameras,</u>** and tilted upward slightly from the horizontal plane, each capturing an image reflected in a different side of said N-sided mirror… " (emphasis added)

E.   The 35 USC 103 Rejection of Claims 10 and 16.

Claims 10 and 16 were rejected under 35 USC 103(a) as being unpatentable over Nalwa in view of Mancuso et al (U.S. Patent No. 6,677,981), herein after Mancuso. The Examiner contended that though Nalwa does not teach the use of a user defined calibration surface, Mancuso teaches this feature. The applicants respectfully disagree with this contention of obviousness.

As previously discussed, the applicants' claimed invention uses an N-sided mirror <u>**to create a camera array with a very small distance D between the virtual centers of projections of the cameras in the array so as to provide minimal parallax error at a predefined distance from the cameras. This distance D is a non-zero value, however.**</u> (Summary, emphasis added)

In contrast, Nalwa teaches a camera system employing an N-sided reflective surface and N cameras. **<u>Nalwa teaches that the cameras are aligned so that the have the same virtual center</u>, as cited by the Examiner on page 2 of the Office Action of December 18, 2006, last paragraph.**

Nalwa does not teach the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and <u>**aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras**</u>.

Mancuso also does not teach the the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and <u>**aligned to have a small distance between virtual centers of projection relative to each**</u>

other which provides minimal parallax error at a predefined distance from the cameras.

Accordingly, Nalwa in combination with Mancuso does not teach the applicants' claimed the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras.** Nor does Nalwa in combination with Mancuso recognize the advantages of the applicants' claimed invention, such as the being able to creat a small video conferencing camera which provides minimal parallax error at a predefined distance from the cameras.

Thus, the applicants have claimed elements not taught in the cited art and which have advantages. Accordingly, no prima facie case of obviousness has been established in accordance with the holding of *In Re Fine*. This lack of prima facie showing of obviousness means that the rejected claims are patentable under 35 USC 103 over Nalwa in view of Mancuso. As such, it is respectfully requested that Claims 10 and 16 be allowed based on the aforementioned quoted claim language.

F.   **The 35 USC 103 Rejection of Claims 11, 12, 15, 18 and 25.**

Claims 11, 12, 15, 18 and 25 were rejected under 35 USC 103(a) as being unpatentable over Nalwa in view of Foote et al (U.S. Patent No. 7,015,954), herein after Foote. The Examiner contended that though Nalwa does not teach the method of combining the images as taught by Claim 11, Foote teaches this feature. The applicants respectfully disagree with this contention of obviousness.

The applicants' claimed invention uses the N-sided mirror **to create a camera array with a very small distance D between the virtual centers of projections of the cameras in the array so as to provide minimal parallax error at a predefined distance from the cameras. This distance D is a non-zero value, however.** (Summary, emphasis added)

In contrast, Nalwa teaches a camera system comprising an N-sided reflective surface and N cameras wherein **the cameras are aligned so that the have the same virtual center, as cited by the Examiner on page 2 of the Office Action, last paragraph.**

Nalwa does not teach the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras.** If each camera had an identical virtual center of projection, as is the case in Nalwa, it would be necessary to use large mirrors. Large mirrors are undesirable for video-conferencing purposes as the camera array should be very small and unobtrusive when it sits in the center of a conference room table.

Foote also does not teach the the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras.**

Accordingly, Nalwa in combination with Foote does not teach the applicants' claimed the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras.** Nor does Nalwa in combination with Foote recognize the advantages of the applicants' claimed invention, such as the being able to creat a small video conferencing camera which provides minimal parallax error at a predefined distance from the cameras.

Thus, the applicants have claimed elements not taught in the cited art and which have advantages. Accordingly, no prima facie case of obviousness has been established in accordance with the holding of *In Re Fine*. This lack of prima facie showing of obviousness means that the rejected claims are patentable under 35 USC

103 over Nalwa in view of Foote. As such, it is respectfully requested that Claims 11, 12, 15, 18 and 25 be allowed based on the aforementioned quoted claim language.

G. The 35 USC 103 Rejection of Claims 4 and 21.

Claims 4 and 21 were rejected under 35 USC 103(a) as being unpatentable over Nalwa in view of Yoshikawa (U.S. Patent No. 7,116,351), herein after Yoshikawa. The applicants respectfully disagree with this contention of obviousness.

The applicants' claimed invention is a camera system that uses N cameras and an N sided mirror to capture images of the surrounding scene. The images from the N cameras are stitched together to create a 360-degree panorama using a calibration surface. The camera system uses the N-sided mirror **to create a camera array with a very small distance D between the virtual centers of projections of the cameras in the array so as to provide minimal parallax error at a predefined distance from the cameras. This distance D is a non-zero value, however.** (Summary, emphasis added)

In contrast, Nalwa teaches a camera system comprising an N-sided reflective surface (40) and N cameras (52, 54, 55 and 58). **Nalwa teaches that the cameras are aligned so that the have the same virtual center, as cited by the Examiner on page 2 of the Office Action, last paragraph.**

Nalwa does not teach the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras.** If each camera had an identical virtual center of projection, as is the case in Nalwa, it would be necessary to use large mirrors. Large mirrors are undesirable for video-conferencing purposes as the camera array should be very small and unobtrusive when it sits in the center of a conference room table.

Yoshikawa also does not teach the the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras**.
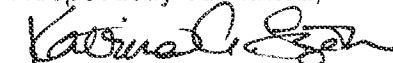
Accordingly, Nalwa in combination with Yoshikawa does not teach the applicants' claimed the applicants' claimed N cameras each associated with a different side of an N-sided reflective surface, and **aligned to have a small distance between virtual centers of projection relative to each other which provides minimal parallax error at a predefined distance from the cameras**. Nor does Nalwa in combination with Yoshikawa recognize the advantages of the applicants' claimed invention, such as the being able to creat a small video conferencing camera which provides minimal parallax error at a predefined distance from the cameras.

Thus, the applicants have claimed elements not taught in the cited art and which have advantages. Accordingly, no prima facie case of obviousness has been established in accordance with the holding of *In Re Fine*. This lack of prima facie showing of obviousness means that the rejected claims are patentable under 35 USC 103 over Nalwa in view of Yoshikawa. As such, it is respectfully requested that Claims 4 and 21 be allowed based on the aforementioned quoted claim language.

Summary

In summary, it is believed that the claims 1-22 are in condition for allowance. Allowance of these claims at an early date is courteously solicited.

Respectfully submitted,

Katrina A. Lyon
Registration No. 42,821
Attorney for Applicants

LYON & HARR, LLP
300 Esplanade Drive, Suite 800
Oxnard, CA 93036
(805) 278-8855